

What is claimed is:

1. A film thickness measurement apparatus for measuring a thickness of a film formed on an object, comprising:

5 a first light source for emitting a polarized light to an object;

a light receiving part for receiving a reflected light of said polarized light from said object to acquire a polarization state of said reflected light;

an calculation part for obtaining a thickness of a film on said object on the basis of said polarization state;

10 a second light source for emitting an illumination light;

an optical system for guiding said illumination light to said object and guiding a reflected light of said illumination light from said object to a predetermined position;

a light shielding pattern disposed at a position almost optically conjugate to an aperture stop position on an optical path from said second light source to said object; and

15 an imaging part for acquiring an image of said light shielding pattern formed on said predetermined position,

wherein said calculation part obtains a tilt angle of said object on the basis of an output from said imaging part and obtains a thickness of said film from said polarization state, by using said tilt angle.

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2. The film thickness measurement apparatus according to claim 1, further comprising:

a filter disposed at a position almost optically conjugate to a field stop position on an optical path from said second light source to said object,

25 wherein said filter cuts off a light of at least specific wavelength at a portion out

of a portion corresponding to a microscopic region on said object.

3. The film thickness measurement apparatus according to claim 1, wherein
said calculation part obtains said tilt angle on the basis of a vector between a
5 predetermined reference position and a barycentric position of an image of said light
shielding pattern in an image indicated by said output from said imaging part.

4. A reflectance measurement apparatus for measuring spectral reflectance of a
measurement object, comprising:
10 a film thickness measurement part for measuring a thickness of a film on a
reference object by ellipsometry; and

a reflectance measurement part for irradiating said reference object and a
measurement object with an illumination light to acquire respective spectral intensities of
reflected lights from said reference object and said measurement object and then
15 obtaining spectral reflectance of said measurement object,

wherein said reflectance measurement part comprises an calculation part for
calculating spectral reflectance of said reference object on the basis of said thickness of
said film on said reference object, which is measured by said film thickness measurement
part, and obtaining said spectral reflectance of said measurement object with reference to
20 said spectral reflectance of said reference object.

5. The reflectance measurement apparatus according to claim 4, wherein
said calculation part further obtains a thickness of a film on said measurement
object by using said spectral reflectance of said measurement object.

6. The reflectance measurement apparatus according to claim 4, wherein
said reference object is a silicon substrate and said film on said reference object
is a natural oxide film.

5 7. A film thickness measurement apparatus for measuring a thickness of a film
formed on an object, comprising:

a light source for emitting a polarized light to an object;

a light receiving part for receiving a reflected light of said polarized light from
said object to acquire a polarization state of said reflected light;

10 an calculation part for obtaining a thickness of a film on said object on the basis
of said polarization state;

a switching mechanism for guiding a light from said light source to a
predetermined position during non-measurement periods; and

15 a wavelength measurement part for acquiring a wavelength of said light guided
to said predetermined position,

wherein said calculation part obtains said thickness of said film on said object by
using said wavelength acquired by said wavelength measurement part.

20 8. The film thickness measurement apparatus according to claim 7, wherein
said switching mechanism has

a stage on which said object is disposed;

a mirror disposed on said stage; and

a mechanism for moving said stage to position said object or said mirror at an
irradiation position of said light from said light source.

9. The film thickness measurement apparatus according to claim 7, further comprising

another light source for emitting an illumination light to said object,

wherein said wavelength measurement part is a spectroscope and said
5 spectroscope receives a reflected light of said illumination light from said object to
acquire spectral intensity of said reflected light.

10. A foreign material inspection apparatus for inspecting presence or absence of
foreign material on a substrate, comprising:

10 a light source for emitting a light to a substrate at a predetermined incident angle;

a light receiving part for acquiring intensity of a p-polarized component of a
reflected light from said substrate; and

a judgment part for judging presence or absence of foreign material on said
substrate on the basis of said intensity of said p-polarized component.

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11. The foreign material inspection apparatus according to claim 10, wherein
said light from said light source is polarized before entering said substrate.

12. The foreign material inspection apparatus according to claim 11, wherein
20 said light source and said light receiving part are part of an ellipsometer.

13. The foreign material inspection apparatus according to claim 10, wherein
said incident angle is an angle at which almost no p-polarized component exists
in a reflected light from a substrate if no foreign material is present.

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14. A reflectance measurement method of measuring spectral reflectance of a measurement object, comprising the steps of:

measuring a thickness of a film on a reference object by ellipsometry;

5 irradiating said reference object and a measurement object with an illumination light to acquire respective spectral intensities of reflected lights from said reference object and said measurement object; and

calculating spectral reflectance of said reference object on the basis of said thickness of said film on said reference object and obtaining said spectral reflectance of said measurement object with reference to said spectral reflectance of said reference
10 object.

15. The reflectance measurement method according to claim 14, further comprising the step of

obtaining a thickness of said film on said measurement object by using said
15 spectral reflectance of said measurement object.

16. The reflectance measurement method according to claim 14, wherein said reference object is a silicon substrate and said film on said reference object is a natural oxide film.
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17. A foreign material inspection method of inspecting presence or absence of foreign material on a substrate, comprising the steps of:

emitting a light from a light source to a substrate at a predetermined incident angle;

25 acquiring intensity of a p-polarized component of a reflected light from said

substrate; and

judging presence or absence of foreign material on said substrate on the basis of said intensity of said p-polarized component.

5 18. The foreign material inspection method according to claim 17, wherein said light from said light source is polarized before entering said substrate.

 19. The foreign material inspection method according to claim 18, wherein
a light from said light source is used when a thickness of a film on a substrate is
10 measured by ellipsometry.

 20. The foreign material inspection method according to claim 17, wherein
said incident angle is an angle at which almost no p-polarized component exists
in a reflected light from a substrate if no foreign material is present.

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